

[TITLE OF THE DOCUMENT] CLAIMS

[CLAIM 1]

A foldable portable terminal comprising a body cabinet (1) and a cover cabinet (2) openably/closably coupled to each other; a first speaker (41) disposed in the cover cabinet (2); one or more sound emitting holes (22a) for passing a sound wave emitted from the first speaker (41), provided on an inner surface of the cover cabinet (2) in a position opposed to the first speaker (41); one or more openings (12a) provided on an inner surface of the body cabinet (1) in a position to be opposed to the sound emitting holes (22a) with the both cabinets (1, 2) closed; and a microphone (14) disposed in the body cabinet (1) toward the openings (12a), the foldable portable terminal being characterized in that:

the cover cabinet (2) comprises a second speaker (42) for emitting a sound wave toward a rear surface thereof, and the cover cabinet (2) comprises a partition wall formed therein and between a first area having the first speaker (41) disposed therein and a second area having the second speaker (42) disposed therein for partitioning these two areas.

[CLAIM 2]

The foldable portable terminal according to claim 1, wherein the partition wall is formed by a rib (25) projecting

from one of two inner walls opposed to each other inside the cover cabinet (2) toward the other inner wall, and a cushion member (43) intervening between an end of the rib (25) and the other inner wall.

5 [CLAIM 3]

The foldable portable terminal according to claim 1, wherein the cover cabinet (2) comprises an inner cabinet half (28) forming the inner surface of the cover cabinet (2) and a rear cabinet half (29) forming the rear surface of the cover cabinet (2), joined to each other, and the partition wall is formed by a first projection (26) projecting from the inner cabinet half (28), a second projection (27) projecting from the rear cabinet half (29) and being opposed to the first projection (26), and a seal member (44) intervening between 10 the both projections (26, 27).
15

[TITLE OF THE DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] FOLDABLE PORTABLE TERMINAL

[TECHNICAL FIELD]

[0001]

5 The present invention relates to a foldable portable terminal, such as a foldable portable telephone, including a pair of flat cabinets openably/closably coupled to each other.

[BACKGROUND ART]

10 [0002]

In recent years, foldable portable telephones have been making progress in multi-functionalization along with being made smaller and thinner. Development is in progress of foldable portable telephones that allow communication and 15 message transmission and reception even with the both cabinets closed (see, for example, Patent Documents 1-3).

[0003]

A foldable portable telephone shown in for example FIG. 9 and FIG. 10 has been proposed as a foldable portable 20 telephone that allows communication even with the both cabinets closed.

The foldable portable telephone includes a body cabinet 8 and a cover cabinet 9 openably/closably coupled to each other through a hinge mechanism 83. A plurality of manual

keys 81 and a transmitter 82 are disposed on an inner surface of the body cabinet 8, while a microphone 84 is disposed inside the body cabinet 8 toward the transmitter 82.

The cover cabinet 9 has an inner surface provided with
5 a main display 91 and a first receiver 92 disposed in a position to be opposed to the transmitter 82 with the both cabinets 8, 9 closed. A second receiver 93 is disposed on a rear surface of the cover cabinet 9. The cover cabinet 9 has an interior provided with a first speaker 94 disposed toward
10 the first receiver 92 and a second speaker 95 disposed toward the second receiver 93.

A first projection 85 projects near the transmitter 82 of the body cabinet 8, while a second projection 96 projects near the first receiver 92 of the cover cabinet 9, the both
15 projections 85, 96 being in contact with each other with the both cabinets 8, 9 closed.

[0004]

With the foldable portable telephone, when the both cabinets 8, 9 are closed as shown in FIG. 10, a cabinet
20 open/close detector (not shown) detects that the both cabinets 8, 9 are closed to feed a detection signal based on the detection to a control circuit (not shown). The control circuit causes the microphone 84 and the second speaker 95 to function in response to the detection signal. Accordingly,

speech transmission and reception become possible with the both cabinets 8, 9 closed. It is therefore unnecessary to open the both cabinets 8, 9 when a call is received.

[Patent Document 1] JP 2003-18257, A [H04M1/02]

5 [Patent Document 2] JP 2003-51871, A [H04M1/02]

[Patent Document 3] JP 2003-134201, A [H04M1/02]

[DISCLOSURE OF THE INVENTION]

[PROBLEM TO BE SOLVED BY THE INVENTION]

[0005]

10 However, with the foldable portable telephone, when speech transmission and reception are performed with the both cabinets 8, 9 closed as shown in FIG. 10, vibration of the second speaker 95 can be transmitted to the first speaker 94 through the air inside the cover cabinet 9 to thereby vibrate
15 the first speaker 94. This can cause the first speaker 94 to emit a sound wave having a waveform approximated to that of a sound wave emitted from the second speaker 95. The sound wave emitted from the first speaker 94 can be transmitted to the microphone 84 because the first speaker 94 is opposed to
20 the microphone 84 through the first receiver 92 and the transmitter 82. Consequently, a loop of an acoustic transmission path can be formed between the second speaker 95 and the microphone 84 through the first speaker 94. This can transmit the other party's voice emitted from the second

speaker 95 to the microphone 84 to generate a phenomenon where the voice is transmitted to the other party, i.e., howling, which has been causing a problem of giving the other party displeasure.

5 [0006]

Accordingly, an object of the present invention is to provide a foldable portable terminal including a pair of coupled cabinets, wherein when one of a pair of speakers disposed in one cabinet vibrates, the other speaker does not
10 vibrate with this vibration.

[MEANS FOR SOLVING THE PROBLEM]

[0007]

In a foldable portable terminal of the present invention, a body cabinet 1 and a cover cabinet 2 are
15 openably/closably coupled to each other. A first speaker 41 is disposed in the cover cabinet 2. One or more sound emitting holes 22a for passing a sound wave emitted from the first speaker 41 is provided on an inner surface of the cover cabinet 2 in a position opposed to the first speaker 41. One
20 or more openings 12a is provided on an inner surface of the body cabinet 1 in a position to be opposed to the sound emitting holes 22a with the both cabinets 1, 2 closed. A microphone 14 is disposed in the body cabinet 1 toward the openings 12a. A second speaker 42 is further disposed in the

cover cabinet 2 for emitting a sound wave toward a rear surface thereof. A partition wall for partitioning a first area having the first speaker 41 disposed therein and a second area having the second speaker 42 disposed therein is
5 formed between these two areas inside the cover cabinet 2.

[0008]

With the above-described foldable portable terminal of the present invention, the microphone 14 of the body cabinet 1 and the first speaker 41 of the cover cabinet 2 become
10 opposed to each other through the openings 12a and the sound emitting holes 22a by closing the both cabinets 1, 2. At this time, both of the microphone 14 and the second speaker 42 face the opposite side of the rear surface of the body cabinet 1. The microphone 14 and the second speaker 42
15 caused to function in this state allow a user to perform speech transmission and reception with the microphone 14 and the second speaker 42 facing himself even when the both cabinets 1, 2 are closed.

[0009]

20 At this time, vibration of the second speaker 42 can vibrate the air in the second area inside the cover cabinet 2. However, the partition wall intervenes between the both speakers 41, 42, so that the vibration from the second area toward the first area is intercepted by the partition wall.

This will prevent the first speaker 41 from vibrating with the vibration of the second speaker 42.

[0010]

The microphone 14 and the first speaker 41 caused to 5 function in the opened state of the both cabinets 1, 2, allow the user to perform speech transmission and reception with his mouth close to the openings 12a and his ear close to the sound emitting holes 22a.

[0011]

10 Specifically, the partition wall is formed by a rib 25 projecting from one of two inner walls opposed to each other inside the cover cabinet 2 toward the other inner wall, and a cushion member 43 intervening between an end of the rib 25 and the other inner wall.

15 In the specific construction, the vibration of the air in the second area with the vibration of the second speaker 42 is effectively absorbed due to elasticity of the cushion member 43 forming the partition wall.

[0012]

20 In another specific construction, the cover cabinet 2 comprises an inner cabinet half 28 forming the inner surface of the cover cabinet 2 and a rear cabinet half 29 forming the rear surface of the cover cabinet 2, joined to each other, and the partition wall is formed by a first projection 26

projecting from the inner cabinet half 28, a second projection 27 projecting from the rear cabinet half 29 and being opposed to the first projection 26, and a seal member 44 intervening between the both projections 26, 27.

5 [0013]

In the specific construction, the both projections 26, 27 pinch the seal member 44 to thereby bring the both projections 26, 27 into close contact with the seal member 44. This will prevent any gap from existing between the both 10 projections 26, 27 and the seal member 44.

[EFFECT OF THE INVENTION]

[0014]

In the foldable portable terminal of the present invention, when one of a pair of speakers disposed in one 15 cabinet vibrates, the other speaker does not vibrate with this vibration. This prevents a loop of an acoustic transmission path from being formed between the one speaker and the microphone disposed in the other cabinet. Howling is therefore does not occur.

20 [BEST MODE FOR CARRYING OUT THE INVENTION]

[0015]

Foldable portable telephones embodying the present invention will be specifically described below with reference to the drawings.

First Embodiment

As shown in FIG. 1 and FIG. 2, a foldable portable telephone of the present embodiment includes a body cabinet 1 coupled to a cover cabinet 2 through a hinge mechanism 3.

5 The both cabinets 1, 2 are foldable with an inner surface of the body cabinet 1 and an inner surface of the cover cabinet 2 opposed to each other. The cover cabinet 2 includes an inner cabinet half 28 joined to a rear cabinet half 29. The body cabinet 1 also has a construction similar to that of the

10 cover cabinet 2.

[0016]

As shown in FIG. 1, a plurality of manual keys 11 are disposed on the inner surface of the body cabinet 1. A transmitter 12 is recessed below the manual keys 11. The

15 transmitter 12 is formed with an opening 12a penetrating inwardly from the inner surface side of the body cabinet 1. A microphone 14 is disposed inside the body cabinet 1 toward the opening 12a. As shown in FIG. 1 and FIG. 3, a plurality of side keys 13 are disposed on a side surface of the body

20 cabinet 1.

[0017]

As shown in FIG. 1, a main screen 21 is disposed on the inner surface of the cover cabinet 2. A receiver 22 provided with a sound emitting hole 22a is disposed above the main

screen 21 in a position to be opposed to the transmitter 12 with the both cabinets 1, 2 closed.

[0018]

As shown in FIG. 2, the cover cabinet 2 has a rear surface provided with a sub screen 23, and a sound emitter 24 provided with a plurality of through holes 24a and disposed between the sub screen 23 and the hinge mechanism 3.

[0019]

As shown in FIG. 3 to FIG. 5, a display assembly 5 is disposed between the inner cabinet half 28 and the rear cabinet half 29 forming the cover cabinet 2. A first speaker 41 is disposed above the display assembly 5 toward a receiver 22 on an inner surface of the cover cabinet 2.

As shown in FIG. 4, the display assembly 5 includes a main liquid crystal display 51 placed on an inner surface of a metal frame 50 and a sub liquid crystal display 52 placed on a rear surface of the frame 50. The main liquid crystal display 51 is opposed to the main screen 21 disposed on the inner cabinet half 28, while the sub liquid crystal display 52 is opposed to the sub screen 23 disposed on the rear cabinet half 29. A second speaker 42 is disposed below the sub liquid crystal display 52 toward a sound emitter 24 on a rear surface of the cover cabinet 2.

[0020]

As shown in FIG. 5, a flexible lead 53 led from the sub liquid crystal display 52 extends between the frame 50 and the inner cabinet half 28, covering an upper end of the display assembly 5, and has an end thereof connected to the 5 main liquid crystal display 51. Disposed on the upper end of the display assembly 5 is, as shown in FIG. 3 and FIG. 5, a cushion member 43 made of urethane, which is in contact with the flexible lead 53 to cover the flexible lead 53 and in contact with an inner wall of the rear cabinet half 29.

10 [0021]

As shown in FIG. 5, from the inner cabinet half 28 toward the rear cabinet half 29 projects a rib 25 intervening between the display assembly 5 and the first speaker 41 and extending in a direction intersecting both sides of the cover 15 cabinet 2. The cushion member 43 is pinched and held by an end of the rib 25 and the inner wall of the rear cabinet half 29. A pair of signal lines 45, 45 extending from the first speaker 41 penetrate a pair of through holes 25a, 25a formed in the rib 25 to extend to a substrate assembly 15 inside the 20 body cabinet 1 shown in FIG. 4. The through holes 25a shown in FIG. 5 have an inner diameter approximately same as an outer diameter of the signal lines 45 to prevent any gap from existing between the through holes 25a and the signal lines 45.

In this way, a partition wall including the rib 25 and the cushion member 43 is formed inside the cover cabinet 2. The interior of the cover cabinet 2 is divided by the partition wall into a first containing section 46 having the 5 first speaker 41 disposed therein and a second containing section 47 having disposed therein the display assembly 5 including the second speaker 42.

[0022]

With the above-described foldable portable telephone of 10 the present embodiment, speech transmission and reception, message transmission and reception and creation of a transmitting message can be performed with the both cabinets 1, 2 opened as shown in FIG. 1.

Opening the both cabinets 1, 2 exposes the main screen 15 21 and the receiver 22 on the inner surface of the cover cabinet 2, and at the same time exposes the manual keys 11 and the transmitter 12 on the inner surface of the body cabinet 1. At this time, a cabinet open/close detector (not shown) detects the open state of the both cabinets 1, 2 to 20 feed a detection signal based on the detection to a control circuit (not shown). The control circuit causes the microphone 14 and the first speaker 41 to function in response to the detection signal.

[0023]

Consequently, when a call arrives, the main screen 21 displays the other party's telephone number and name. Accordingly, the user can perform an off-hook operation with a manual key 11 to allow the call, and answer the incoming 5 call with the receiver 22 close to his ear and the transmitter 12 close to his mouth.

[0024]

When a message is received, contents of the received message are displayed on the main screen 21 by manipulation 10 of a manual key 11, so that the contents can be checked. When a message is created, texts created by the user are displayed on the main screen 21 by manipulation of a manual key 11.

[0025]

15 When the above-described foldable portable telephone of the present embodiment is carried in a pocket or a bag, the both cabinets 1, 2 are folded from an opened state of the both cabinets 1, 2 as shown in FIG. 1 to close the both cabinets 1, 2 as shown in FIG. 2. This hides the main screen 20 21 and the plurality of manual keys 11 shown in FIG. 1 inside the both cabinets 1, 2. Under these circumstances, there is no possibility that the main screen 21 may be damaged by an action of an external force, nor is the possibility that the plurality of manual keys 11 may be pressed by an action of an

external force to cause misoperation.

As shown in FIG. 3, the opening 12a of the transmitter 12 is not closed by the inner surface of the cover cabinet 2 because the transmitter 12 is recessed.

5 [0026]

Depressing a side key 13 in this state to set a hands-free mode allows the user to perform speech transmission and reception with the foldable portable telephone in a closed state placed on a desk without held by the user's hand. When 10 the both cabinets 1, 2 are placed on a desk with a rear surface of the body cabinet 1 in contact with a surface of the desk, the sound emitter 24 and the transmitter 12 thereby become opposed to the user.

At this time, the cabinet open/close detector detects 15 the closed state of the both cabinets 1, 2 to feed a detection signal based on the detection to the control circuit. The control circuit causes the microphone 14 and the second speaker 42 to function in response to the detection signal and the hands-free mode being set.

20 [0027]

Consequently, when a call is received, the other party's voice emitted from the second speaker 42 shown in FIG. 2 is emitted toward the user through the plurality of sound emitting holes 24a of the sound emitter 24, while the

user's voice through the opening 12a of the transmitter 12 is transmitted to the microphone 14 and sent to the other party, so that speech transmission and reception are performed.

[0028]

5 At this time, vibration of the second speaker 42 can vibrate the air inside the second containing section 47 of the cover cabinet 2 shown in FIG. 4. However, the vibration from the second containing section 47 toward the first containing section 46 is reflected by the rib 25 forming the
10 partition wall, or absorbed by elasticity of the cushion member 43. This will prevent the vibration of the air inside the second containing section 47 from reaching the first speaker 41 in the first containing section 46.

[0029]

15 As described above, according to the above-described foldable portable telephone of the present embodiment, a loop of an acoustic transmission path through the first speaker 41 will not be formed between the second speaker 42 and the microphone 14 because the first speaker 41 will not vibrate
20 with the vibration of the second speaker 42. Therefore, howling will not occur, so that hands-free speech transmission and reception are possible in good call condition.

[0030]

Second Embodiment

A foldable portable telephone of the present embodiment shown in FIG. 6 to FIG. 8 differs from that of the above-described first embodiment in a structure of the partition wall, but is the same as that of the first embodiment in other structures, and therefore will be described as to the structure of the partition wall, and not described as to the other structures with the same reference characters.

[0031]

With the foldable portable telephone of the present embodiment, as shown in FIG. 6, from the inner cabinet half 28 of the cover cabinet 2 toward the rear cabinet half 29 projects a flat plate-like first projection 26 intervening between the display assembly 5 and the first speaker 41 and extending in a direction intersecting both sides of the cover cabinet 2. As shown in FIG. 8, a second projection 27 extending in a direction intersecting both sides of the cover cabinet 2 projects from the rear cabinet half 29 toward the inner cabinet half 28 in a position opposed to the first projection 26. The second projection 27 is formed by a pair of protrusions 27a, 27a. One protrusion 27a is positioned slightly closer to the first speaker 41 than the first projection 26 is, while the other protrusion 27a is positioned slightly closer to the display assembly 5 than the

first projection 26 is.

[0032]

A seal member 44 covering an end of the first projection 26 intervenes between the both projections 26, 27.

- 5 Due to the both cabinet halves 28, 29 being joined to each other, a middle portion of the seal member 44 is pressed toward the rear cabinet half 29 by the first projection 26, while both end portions of the seal member 44 are pressed toward the inner cabinet half 28 by the pair of protrusions
- 10 27a, 27a of the second projection 27. Consequently, the seal member 44 is pinched by the both projections 26, 27. The both projections 26, 27 and the seal member 44 are thereby brought into close contact with each other to prevent any gap from existing between the both projections 26, 27 and the
- 15 seal member 44.

[0033]

- As shown in FIG. 6, the pair of signal lines 45, 45 extending from the first speaker 41 penetrate a box 45b formed penetrating the first projection 26 to extend to the
- 20 substrate assembly 15 inside the body cabinet 1 shown in FIG. 7.

In this way, a partition wall including the both projections 26, 27 and the seal member 44 is formed inside the cover cabinet 2. The interior of the cover cabinet 2 is

divided by the partition wall into the first containing section 46 containing the first speaker 41 and the second containing section 47 containing the display assembly 5 including the second speaker 42.

5 [0034]

With the above-described foldable portable telephone of the present embodiment, because the partition wall partitioning the both containing sections 46, 47 without any gap is formed between the both speakers 41, 42, the vibration 10 from the second speaker 42 will not be transmitted to the first containing section 46 even when the second speaker 42 and the microphone 14 are caused to function with the both cabinets 1, 2 closed. Therefore, a loop of an acoustic transmission path through the first speaker 41 will not be 15 formed between the second speaker 42 and the microphone 14, which will prevent howling from occurring.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0035]

[FIG. 1] is a perspective view of a foldable 20 portable telephone in an open state of a first embodiment of the present invention.

[FIG. 2] is a perspective view of the foldable portable telephone in a closed state.

[FIG. 3] is a perspective view showing an exposed

interior of a cover cabinet of the foldable portable telephone.

[FIG. 4] is a sectional view of the foldable portable telephone.

5 [FIG. 5] is an enlarged fragmentary sectional view of the foldable portable telephone.

[FIG. 6] is a perspective view showing an exposed interior of a cover cabinet of a foldable portable telephone of a second embodiment of the present invention.

10 [FIG. 7] is a sectional view of the foldable portable telephone.

[FIG. 8] is an enlarged fragmentary sectional view of the foldable portable telephone.

15 [FIG. 9] is a sectional view of a conventional foldable portable telephone in an open state.

[FIG. 10] is a sectional view of the foldable portable telephone in a closed state.

[EXPLANATION OF REFERENCE NUMERALS]

[0036]

20 (1) body cabinet

(11) manual key

(12) transmitter

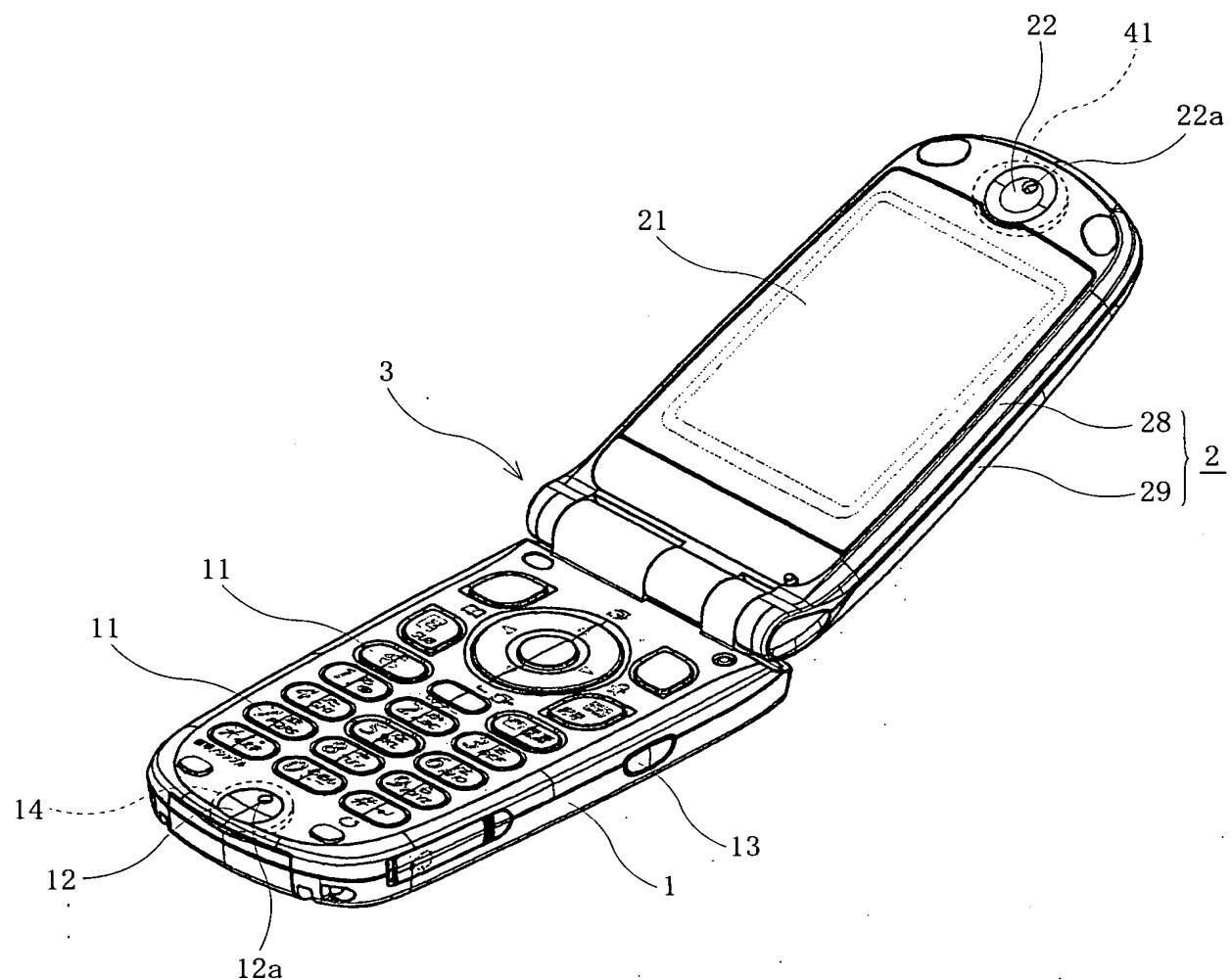
(14) microphone

(2) cover cabinet

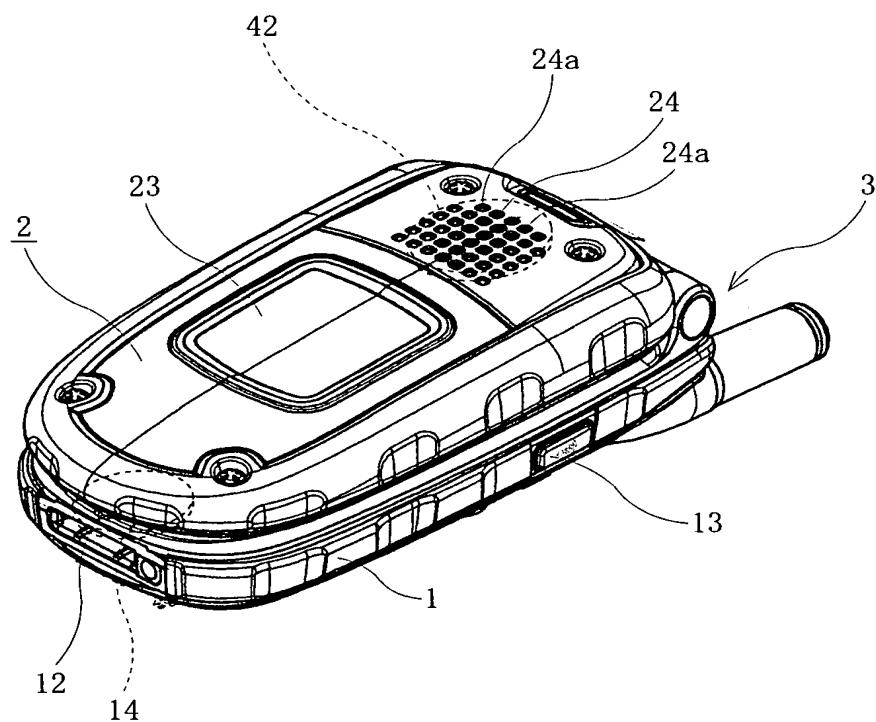
- (21) main screen
- (22) receiver
- (23) sub screen
- (24) sound emitter
- 5 (25) rib
- (26) first projection
- (27) second projection
- (28) inner cabinet half
- (29) rear cabinet half
- 10 (3) hinge mechanism
- (41) first speaker
- (42) second speaker
- (43) cushion member
- (44) seal member
- 15 (46) first containing section
- (47) second containing section
- (5) display assembly

[TITLE OF THE DOCUMENT]

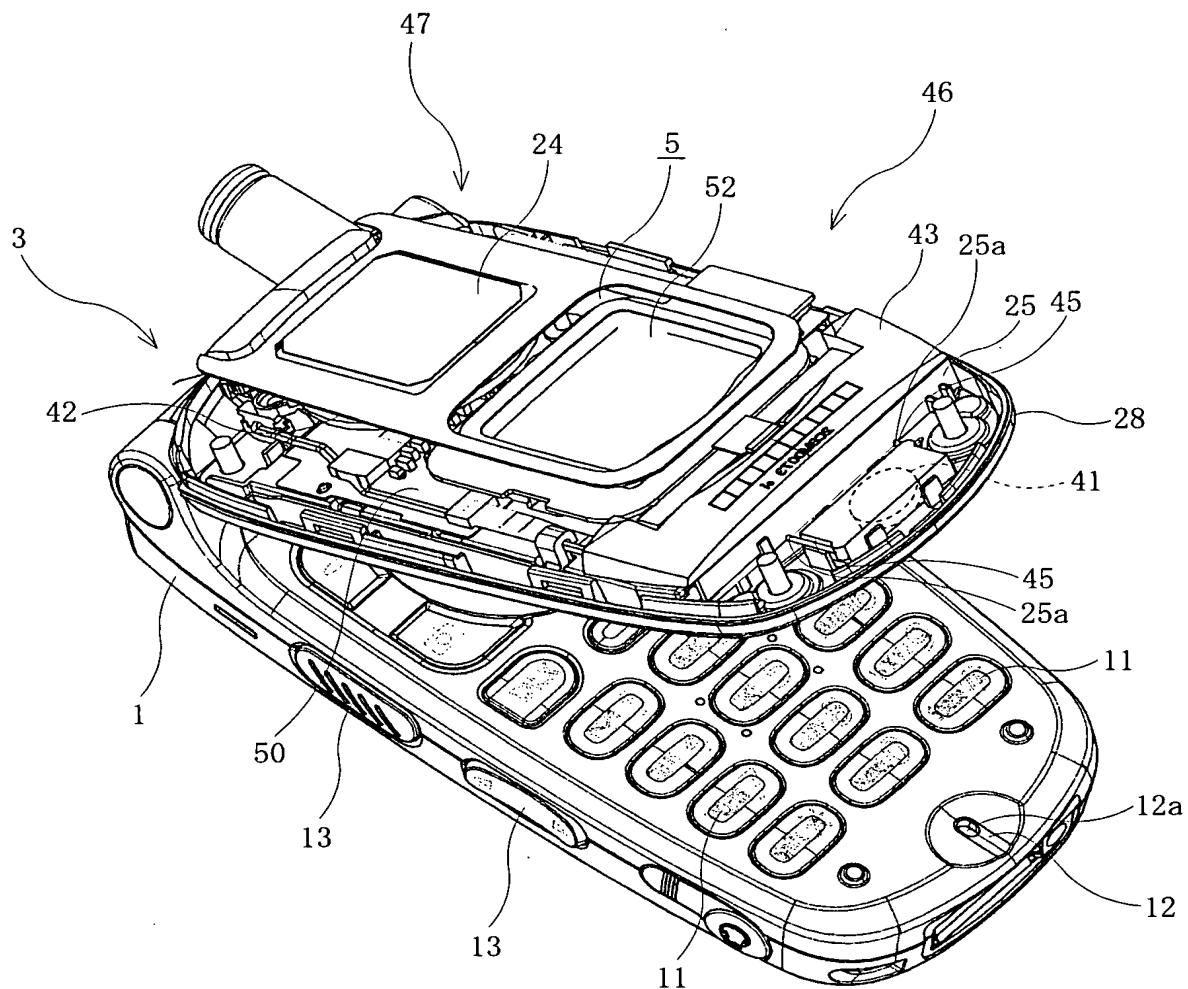
[FIG. 1]



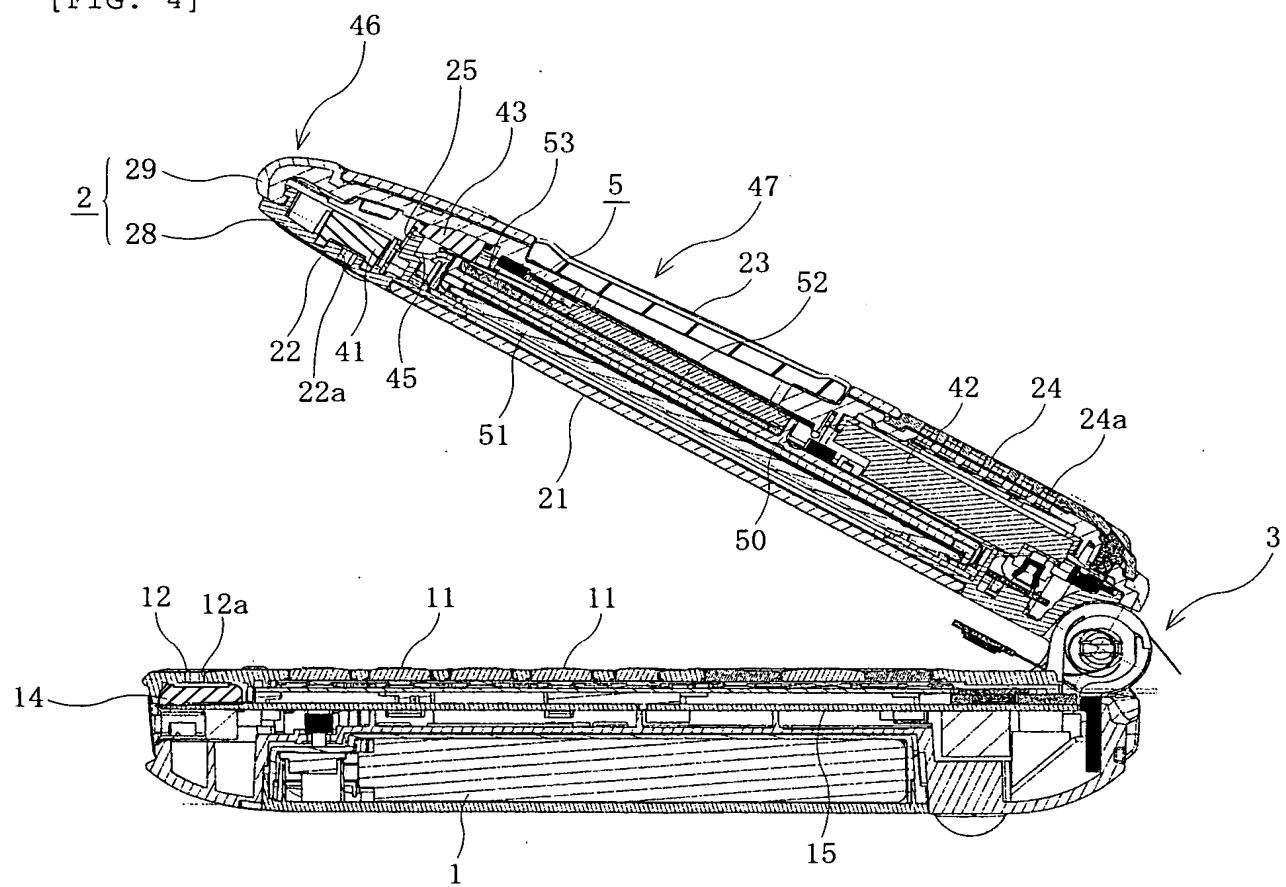
[FIG. 2]



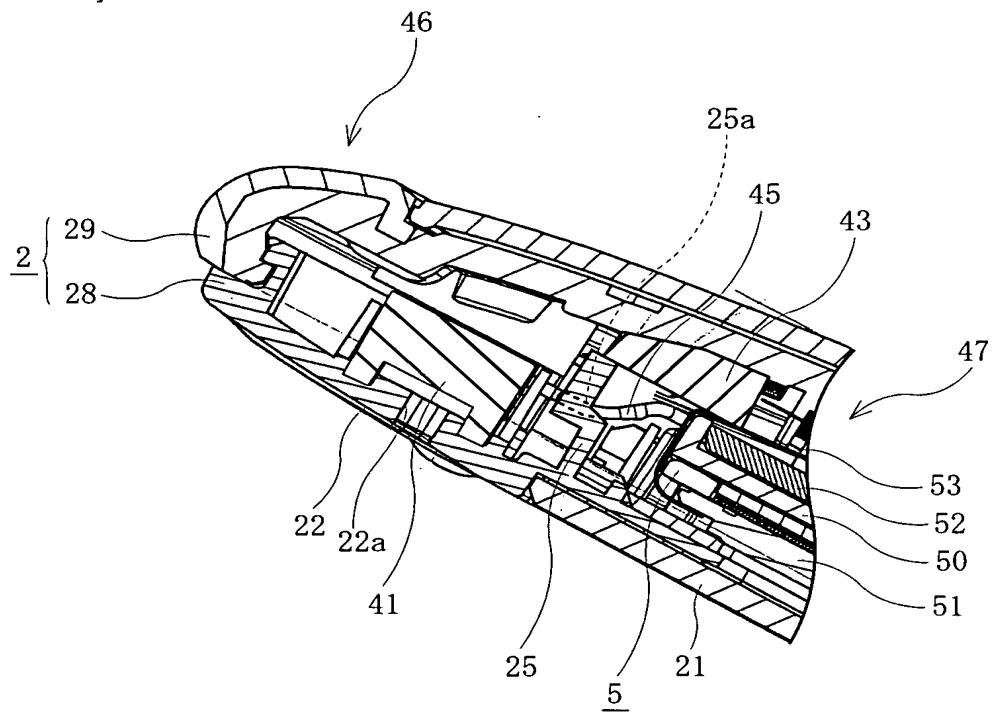
[FIG. 3]



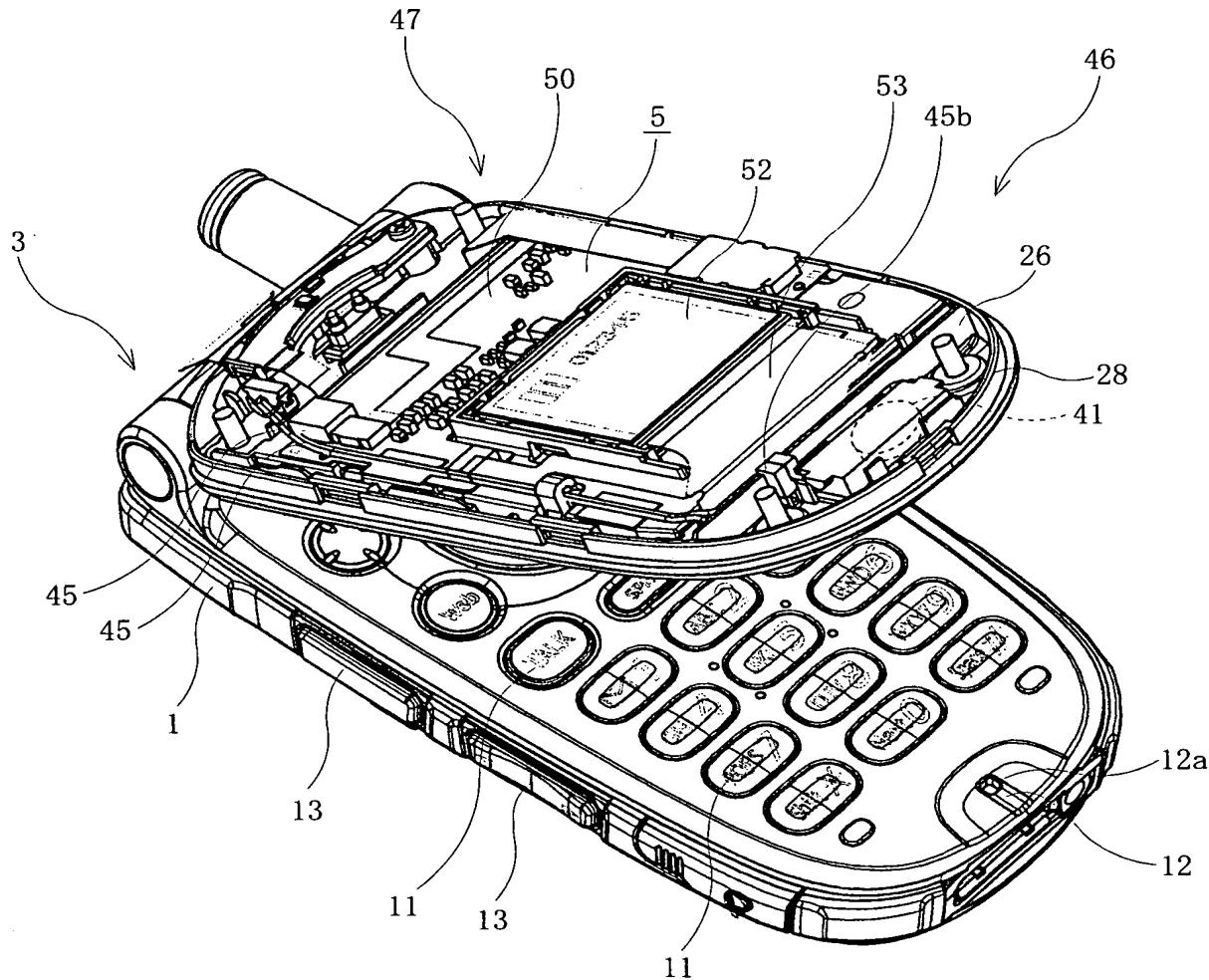
[FIG. 4]



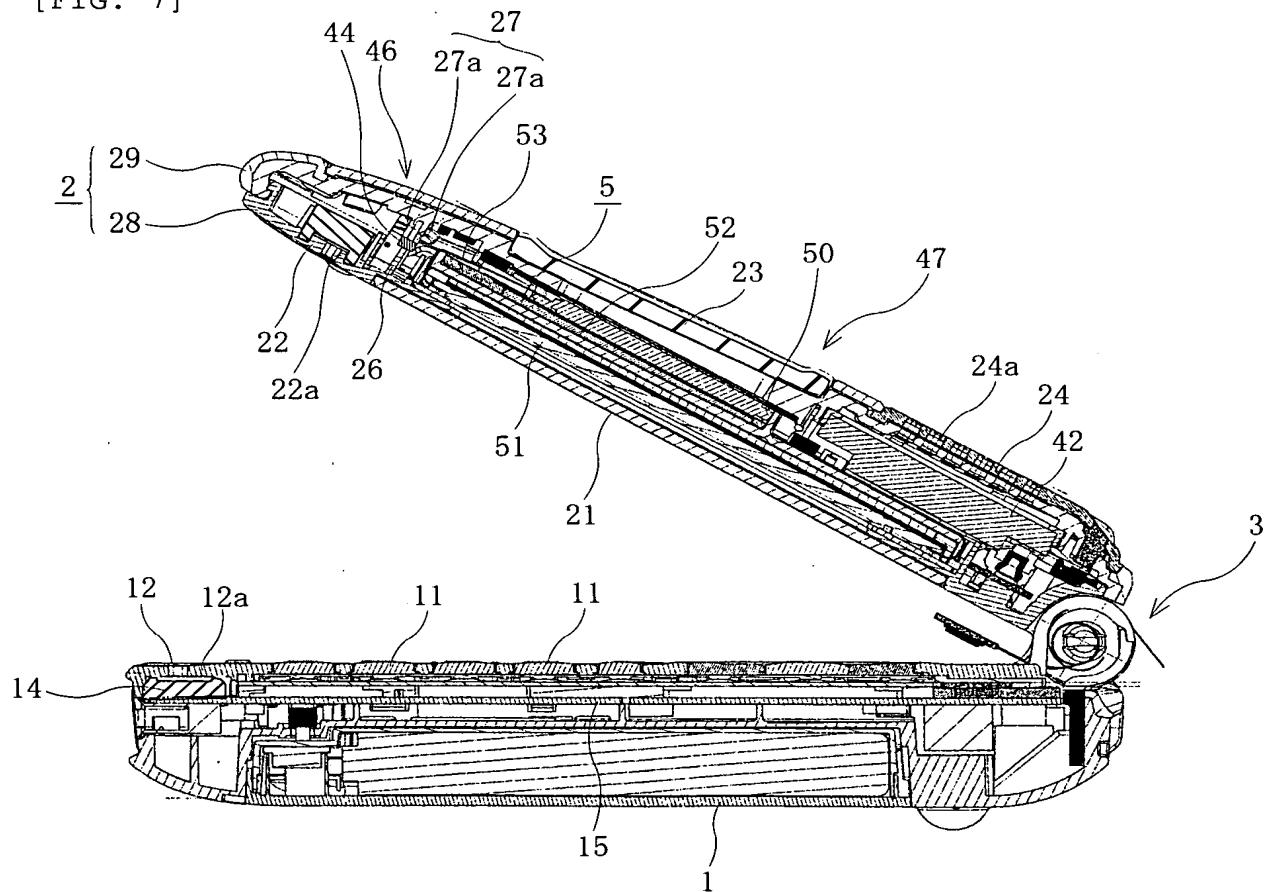
[FIG. 5]



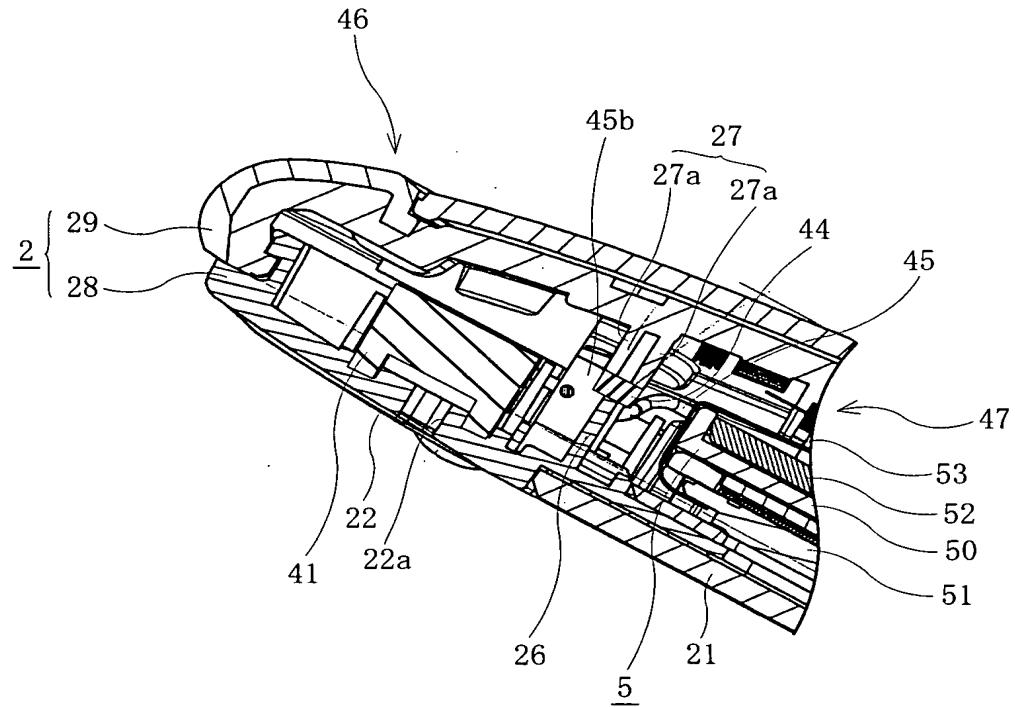
[FIG. 6]



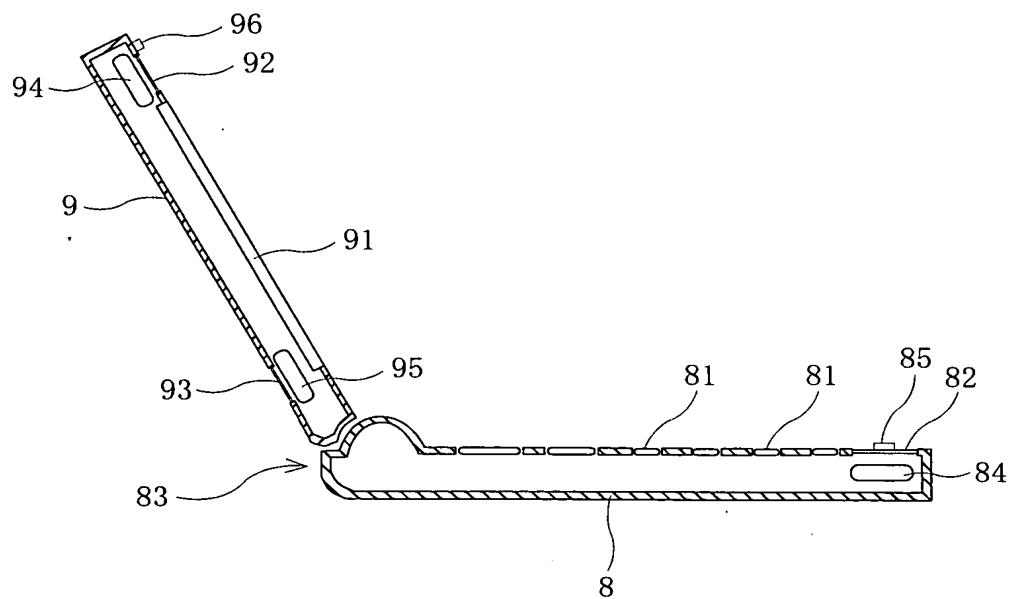
[FIG. 7]



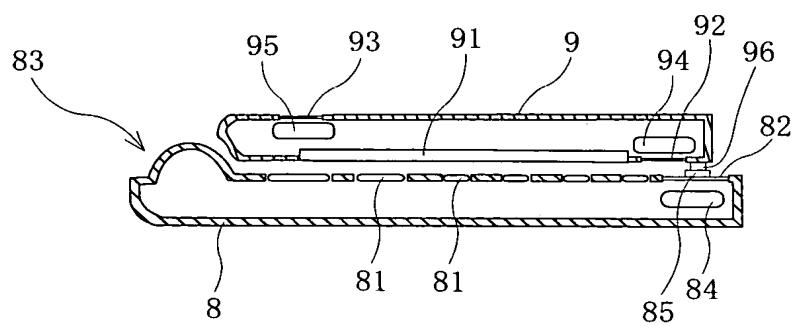
[FIG. 8]



[FIG. 9]



[FIG. 10]



[TITLE OF THE DOCUMENT] ABSTRACT

[ABSTRACT]

[PROBLEM] To prevent howling from occurring in a foldable portable terminal including a pair of cabinets
5 openably/closably coupled to each other.

[SOLUTION] A foldable portable terminal of the present invention includes a body cabinet 1 provided with a microphone 14 and a cover cabinet 2 provided with first and second speakers 41, 42, openably/closably coupled to each
10 other. The cover cabinet 2 has therein a rib 25 projecting from the inner cabinet half 28 of the cover cabinet 2 toward the rear cabinet half 29, and a cushion member 43 made of urethane and disposed between the rib 25 and the rear cabinet half 29, forming a partition wall for partitioning a first
15 containing section 46 containing the first speaker 41 and a second containing section 47 containing the second speaker 42.

[CHOSEN DRAWING] FIG. 4